REMARKS

This application has been carefully reviewed in light of the Office Action dated August 17, 2009. Claim 57 has been newly added. Claims 1 to 3, 6, 7, 43, 46 and 57 are in the application, with Claims 4, 5, 8 to 42, 44, 45, and 47 to 56 being withdrawn from consideration. Of the claims presented for examination, Claims 1, 2 and 57 are in independent form. Reconsideration and further examination are respectfully requested.

The Office Action included objections to the specification. The foregoing amendments to the specification are seen to attend to these objections. Accordingly, reconsideration and withdrawal of the objections to the specification are respectfully requested.

Claims 1 to 3, 6, 7, 43 and 46 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,879,158 (Doyle). Although Claims 1 and 2 have been amended, this should be viewed as a traversal, as explained more fully below.

Known approaches for creating a statistically average tooth typically fail to calculate or generate an overall metrical average tooth surface with a natural looking occlusal or anatomical morphology representative for the respective tooth type. One limitation is that side length values or distances do not include information about angles, directions and positions. Therefore, if averaged, different information is combined. Another limitation is that averaging single points is highly dependent from position and rotation of the single object. Without any pre-processing, this averaging typically results in a blurry average tooth surface which does not represent a natural looking tooth.

Claim 1

Claim 1 is directed to the creation of an electronic data set of a natural looking tooth that can be used for creating a dental prosthetic item, a tooth restoration, or a tooth model. A plurality of electronic data sets of a certain tooth type is generated by scanning a predetermined minimum number of teeth of the same tooth type. For each individual electronic data set, at least a certain number of at least one of correspondence points and correspondence structures that are characterized for this tooth type are assigned in the individual electronic data set. The correspondence points and correspondence structures assigned for the individual electronic data set identify correspondences between points and structures of the individual electronic data set and points and structures of other electronic data sets. An average value from the electronic data sets is created by taking into account the assignment of at least one of the correspondence points and correspondence structures in each of the individual data sets. An electronic average data set derived from the average value is made available as an electronic representation a natural looking tooth having an average tooth surface with respect to the scanned teeth

Applicant submits that Doyle is not seen to disclose or to suggest at least the features of generating a plurality of electronic data sets for the same tooth type, and for each individual electronic data set, assigning at least a certain number of at least one of correspondence points and correspondence structures that are characterized for this tooth type in the individual electronic data set, wherein the correspondence points and correspondence structures assigned for the individual electronic data set identify correspondences between points and structures of the individual electronic data set and

points and structures of other electronic data sets, and using the assignment of at least one of the correspondence points and correspondence structures in each of the individual data sets to provide an electronic representation a natural looking tooth.

Doyle is seen to disclose generating a digitized three dimensional coded virtual image of a patient's upper and lower teeth and gums by scanning a hard duplicate pattern of the teeth using laser scanning. See Doyle, column 5, lines 1 to 6. An exploded video image of the teeth is presented on a video display, including the central longitudinal axis of each tooth. See Doyle, column 8, lines 42 to 44. The video display displays the upper and lower sets of teeth, with each tooth displayed in its desired location and orientation, and having a longitudinal axis through its center. In Figure 12, the center longitudinal axis of a selected tooth 120 is shown as dotted line A-A'. A comparison of the size, shape, and contour of the selected tooth 120 is compared with another tooth 122, such as a statistically average tooth having a different size, shape, and contour.

Thus, Doyle is seen to disclose using a laser scanning to generate a digitized three dimensional coded virtual image of a patient's teeth, and the comparing a digitized image of a patient's tooth to an image of a statistically average tooth.

On the other hand, the claims define the scanning of a plurality of teeth of the same tooth type to generate a plurality of electronic data sets. For each individual electronic data set, at least a certain number of at least one of correspondence points and correspondence structures that are characterized for this tooth type are assigned in the individual electronic data set. The correspondence points and correspondence structures assigned for the individual electronic data set identify correspondences between points and structures of the individual electronic data set and points and structures of other electronic

data sets. The assignment of at least one of the correspondence points and correspondence structures in each of the individual data sets is used to provide an electronic representation a natural looking tooth.

In contrast, Doyle is seen to disclose using a laser scanning to generate a digitized three dimensional coded virtual image of a patient's upper and lower teeth and gums, and the comparing a digitized image of a patient's tooth to an image of a statistically average tooth. A statistically average tooth is different from an electronic representation of a natural looking tooth. Therefore, Doyle is believed to be silent on scanning a plurality of teeth of the same tooth type to generate a plurality of electronic data sets that are used to provide an electronic representation of a natural looking tooth.

At page 4, the Office Action alleges the following:

> ". . . [Doyle discloses] the use of laser scanning for generating the data of a tooth 120 to be compared to the statistically average tooth. To have used a laser scanning method to have generated the data for the size shape and contours of the plurality of teeth making up the data set for the average tooth in view of the Doyle et all teaching of such a method in generating data for a tooth to be compared to the average tooth would have been obvious to one of ordinary skill in the art."

However, even if Doyle be deemed (for argument's sake) to suggest using laser scanning to generate data for a plurality of teeth making up a data set for an average tooth, the Office Action does not articulate how one of ordinary skill in the art would understand that Doyle teaches or suggests providing an electronic representation of a natural looking tooth.

With regard to "correspondence points and correspondence structures", at page 4, the Office Action further alleges that "such points in a digital laser scanning are

inherently and automatically assigned in measuring the dimensions - e.g. the points along the edges of the tooth." Applicant respectfully disagrees.

The claimed assignment of correspondence points and correspondence structures identifies correspondences between points and structures of an individual electronic data set of a tooth type and points and structures of other electronic data sets of the same tooth type.

Doyle is believed to be silent on the claimed assignment of correspondence points and correspondence structures that identify correspondences between points and structures of an individual electronic data set and points and structures of other electronic data sets of the same tooth type, much less using the assignment of correspondence points and correspondence structures in each of the individual data sets to provide an electronic representation a natural looking tooth.

Therefore, Doyle is not seen to disclose or to suggest at least the features of generating a plurality of electronic data sets for the same tooth type, and for each individual electronic data set, assigning at least a certain number of at least one of correspondence points and correspondence structures that are characterized for this tooth type in the individual electronic data set, wherein the correspondence points and correspondence structures assigned for the individual electronic data set identify correspondences between points and structures of the individual electronic data set and points and structures of other electronic data sets, and using the assignment of at least one of the correspondence points and correspondence structures in each of the individual data sets to provide an electronic representation a natural looking tooth.

In view of the foregoing amendments and remarks, independent Claim 1 is believed to be patentable over Doyle.

Dependent Claims 3, 6 and 7 each depend from Claim 1, and thus partake in its patentability over Doyle. Nonetheless, because each recites and additional aspect of the invention, the independent reconsideration of each on its own merits is respectfully requested.

Claim 2

Claim 2 is directed to the creation of an electronic data set of a natural looking tooth model that can be used for creating a dental prosthetic item, a tooth restoration, or a tooth model. A predetermined minimum number of teeth of the same tooth type are scanned to provide a multiplicity of electronic data sets of this tooth type. For each individual electronic data set, at least a certain number of at least one of correspondence points and correspondence structures that are characterized for this tooth type are assigned in the individual electronic data sets. A principal component analysis is carried out for at least one of the assigned correspondence points and correspondence structures of the scanned teeth to generate principle components for the tooth type. A linear combination of at least a portion of the resulting principal components for the tooth type of interest is carried out and the linear combination is made available as a generic natural looking tooth model data set.

For the reasons discussed above with respect to Claim 1, Applicant submits that Doyle is not seen to teach or suggest at least the features of generating a plurality of electronic data sets for the same tooth type, and for each individual electronic data set,

assigning at least a certain number of at least one of correspondence points and correspondence structures that are characterized for this tooth type in the individual electronic data set, and using the assignment of at least one of the correspondence points and correspondence structures in each of the individual data sets to provide an electronic representation a natural looking tooth.

Moreover, Applicant submits that Doyle is not seen to disclose or to suggest at least the features of carrying out a principal component analysis for at least one of the assigned correspondence points and correspondence structures of the scanned teeth to generate principle components for the tooth type, and carrying out a linear combination of at least a portion of the resulting principal components for the tooth type of interest and making the linear combination available as a generic natural looking tooth model data set.

At page 4, the Office Action alleges that "determination of the size shape and contours of a statistically average tooth is deemed to meet the 'principle component analysis' and 'linear combination' limitations". Applicant respectfully disagrees.

The Office Action provides no evidence whatsoever to support that assertion. Neither does the Office Action articulate how one of ordinary skill in the art would understand that Doyle teaches or suggests carrying out a principal component analysis for at least one of the assigned correspondence points and correspondence structures of the scanned teeth to generate principle components for the tooth type, and carrying out a linear combination of at least a portion of the resulting principal components for the tooth type of interest and making the linear combination available as a generic natural looking tooth model data set.

In view of the foregoing amendments and remarks, independent Claim 2 is believed to be patentable over Doyle.

Dependent Claims 43 and 46 each depend from Claim 2, and thus partake in its patentability over Doyle. Nonetheless, because each recites and additional aspect of the invention, the independent reconsideration of each on its own merits is respectfully requested.

CONCLUSION

No other matters being raised, it is believed that the entire application is fully in condition for allowance, and such action is courteously solicited.

No claim fees are believed due. However, should it be determined that additional claim fees are required under 37 C.F.R. 1.16 or 1.17, the Director is hereby authorized to charge such fees to Deposit Account 06-1205.

Applicants' undersigned attorney may be reached in our Costa Mesa, California office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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